Space Weather Forecast

Issued on Friday, 11 March 2022 at 13:07 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Geomagnetic activity expected to increase days 3 and 4 with a Minor Geomagnetic storm likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with only common-class flares observed. The largest flare of the past 24 hours, a long duration flare from the large plage region to the south of AR2962. This flare has emitted a large coronal mass ejection (CME), which has been analysed, and is expected to hit Earth either late on day 3 (13th March) or early on day 4 (14th March).

There are six numbered sunspot regions on the visible disc, with AR2965 the largest and also magnetically complex, but surprisingly remains dormant at present. There are also two other large groups, AR2960 and AR2964, with AR2960 also magnetically complex. Yet despite the presence of these regions only a common-class flare from a plage region has occurred. The remaining sunspots on the visible disc are small, weak and magnetically simple.

There are also numerous - mostly small - filaments on the disc at present. The largest of these lifted off the southeastern limb late in the UTC evening of 09 March, with the resultant Coronal Mass Ejection (CME) clearly discernible in coronagraphs. This event has been modelled, and counter to expectations does in fact show marginal influence is possible at Earth from at least the shock either late day 3 (13th) or more likely through day 4 (14th), which coincides with the large CME from yesterday.

Solar Wind / Geomagnetic Activity: The solar wind was mostly at background levels throughout, but briefly increased to slightly elevated levels at times. The strength of the magnetic field was weak and steady until 10/1636 UTC after which time it strengthened to temporarily become strong, then lowering slightly to end the day at moderate levels. The important north-south component was generally very weakly negative, but increased to become temporarily moderately negative in the evening, after which the north-south component became erractically variable. The changes in the solar wind parameters indicated that a CME had arrived, probably the one emitted on 7th March, but this may have swept up and included the CME emitted on 5th March as well.

Geomagnetic activity was mainly Quiet but with isolated Active intervals at 10/2100-2400 UTC and 11/0600-0900 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, although the energetic particles did display an increase to slightly elevated levels late in the day, as a result of the CME that was emitted.

Four-Day Space Weather Forecast Summary

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Met Office Space Weather Forecast

Solar Activity: Solar activity is expected to be low, with further common-class flares, but with a daily chance of rising to moderate-class - the main risk being from the complex northeastern sunspot region. Later in the forecast period new regions may rotate onto the visible disc from the far side.

Solar Wind / Geomagnetic Activity: No enhanced solar winds feature in this forecast period. There are now two CMEs potentially Earth-directed, the first with low confidence from the 9th March southeast quadrant filament. This may influence Earth either late day 3 (13th) or through day 4 (14th). Yesterday's large CME has been analysed and is expected to have an Earth directed component, which is expected to arrive either late on day 3 (13th) or early on day 4 (14th) and with probably a larger impact than the 9th March CME. A weak solar enhancement in the solar wind is also due to arrive day 3, from a coronal hole feature.

Geomagnetic activity is currently decreasing to mostly Quiet conditions, after the passing of yesterday's CME, although there is a slight chance of further Unsettled intervals today and tomorrow (12th). During day 3 (13th) activity is likely to increase again, becoming Unsettled to Active, either under the influence of the 9th March CME, but more likely due to the expected arrival of yesterday's full halo CME. This is likely to give a G1/Minor (Kp 5) Storm each day, but especially during days 3 and 4 (13th and 14th), with a Slight Chance of a G2 (Kp 6).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with energetic particles expected to remain predominantly at Background levels, albeit with a slight chance of rising above-the S1 level.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	30	20	70	40
Strong	**G3**	No	1	1	1	1
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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